

Appln. No. 10/691,314
Docket No. 138161/GEM-0080

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (original) A method for acquiring a cardiac image from a patient having a paced heart rhythm, an abnormal EKG, or an irregular heartbeat, the method comprising:
receiving a gated electrocardiogram signal having local maxima and minima values and trigger points;
determining for a period of time the time between each trigger point and the local maxima or minima associated therewith;
in response to the trigger point occurring at the associated local maxima or minima, calculating a zero time differential for a corrected trigger for gating; and
in response to the trigger point not occurring at the associated local maxima or minima, calculating a time differential for the corrected trigger for gating based on the time difference between the trigger point and the associated local maxima or minima.
2. (original) The method of Claim 1, wherein the calculating a time differential comprises:
in response to the trigger point occurring prior to the associated local maxima or minima, calculating a time delay for the corrected trigger; and
in response to the trigger point occurring after the associated local maxima or minima, calculating a time advancement for the corrected trigger.

Appl. No. 10/691,314
Docket No. 138161/GEM-0080

3. (original) The method of Claim 1, further comprising:
for the period of time, calculating at least one of an average, a range, a standard deviation, and a Bayesian probability, for the time differential.
4. (original) The method of Claim 3, further comprising:
in response to the range and standard deviation for the time differential being equal to or less than defined limits, calculating a corrected trigger based on the average time differential.
5. (original) The method of Claim 3, further comprising:
in response to at least one of the range and the standard deviation for the time differential being greater than a defined limit, calculating a corrected trigger for the present heartbeat based on the time differential of the prior heartbeat.
6. (original) The method of Claim 4, further comprising:
sending the corrected trigger to a cardiac image acquisition device for gating;
wherein the gating is substantially synchronized with the local maxima or minima of the irregular electrocardiogram signal.
7. (original) The method of Claim 6, further comprising:
acquiring cardiac images of the irregular heartbeat.
8. (original) The method of Claim 7, wherein the period of time occurs prior to the acquiring cardiac images.
9. (original) The method of Claim 1, wherein the period of time is about 20 seconds.

Appl. No. 10/691,314
Docket No. 138161/GEM-0080

10. (original) The method of Claim 4, wherein the defined limit for the range is about 10 milliseconds and the defined limit for the standard deviation is about 3 milliseconds.

11. (original) An apparatus having electrocardiogram-gated acquisition and cardiac imaging capabilities, the apparatus comprising:

- an electrocardiograph;
- a cardiac scanner in signal communication with the electrocardiograph;
- an interface board in signal communication intermediate the electrocardiograph and the cardiac scanner; and
- a storage medium, readable by a processing circuit, storing instructions for execution by the processing circuit for:
 - receiving from the electrocardiograph a gated electrocardiogram signal having local maxima and minima values and trigger points;
 - determining for a period of time the time between each trigger point and the local maxima or minima associated therewith;
 - in response to the trigger point occurring at the associated local maxima or minima, calculating a zero time differential for a corrected trigger for gating; and
 - in response to the trigger point not occurring at the associated local maxima or minima, calculating a time differential for the corrected trigger for gating based on the time difference between the trigger point and the associated local maxima or minima.

12. (original) The apparatus of Claim 11, wherein the storage medium further includes instructions for execution by the processing circuit for:

- for the period of time, calculating at least one of an average, a range, a standard deviation, and a Bayesian probability, for the time differential; and
- in response to the range and standard deviation for the time differential being equal to or less than defined limits, calculating a corrected trigger based on the average time differential.

Appln. No. 10/691,314
Docket No. 138161/GEM-0080

13. (original) The apparatus of Claim 12, wherein the storage medium further includes instructions for execution by the processing circuit for:

in response to at least one of the range and the standard deviation for the time differential being greater than a defined limit, calculating a corrected trigger for the present heartbeat based on the time differential of the prior heartbeat.

14. (original) The apparatus of Claim 13, wherein the storage medium further includes instructions for execution by the processing circuit for:

sending the corrected trigger to the cardiac scanner for gating; and
subsequent to the period of time, acquiring cardiac images of the irregular heartbeat;

wherein the gating is substantially synchronized with the local maxima or minima of the irregular electrocardiogram signal.

15. (original) A computer program product for acquiring a cardiac image from a patient having a paced heart rhythm, an abnormal EKG, or an irregular heartbeat, the product comprising:

a storage medium, readable by a processing circuit, storing instructions for execution by the processing circuit for:

receiving from an electrocardiograph a gated electrocardiogram signal having local maxima and minima values and trigger points;

determining for a period of time the time between each trigger point and the local maxima or minima associated therewith;

in response to the trigger point occurring at the associated local maxima or minima, calculating a zero time differential for a corrected trigger for gating; and

in response to the trigger point not occurring at the associated local maxima or minima, calculating a time differential for the corrected trigger for gating based on the time difference between the trigger point and the associated local maxima or minima.

Appln. No. 10/691,314
Docket No. 138161/GEM-0080

16. (original) The computer program of Claim 15, further comprising instructions for execution by the processing circuit for:

for the period of time, calculating at least one of an average, a range, a standard deviation, and a Bayesian probability, for the time differential; and

in response to the range and standard deviation for the time differential being equal to or less than defined limits, calculating a corrected trigger based on the average time differential.

17. (original) The computer program of Claim 16, further comprising instructions for execution by the processing circuit for:

in response to at least one of the range and the standard deviation for the time differential being greater than a defined limit, calculating a corrected trigger for the present heartbeat based on the time differential of the prior heartbeat.

18. (original) The computer program of Claim 17, further comprising instructions for execution by the processing circuit for:

sending the corrected trigger to a cardiac scanner for, subsequent to the period of time, gating and acquiring cardiac images of the irregular heartbeat;

wherein the gating is substantially synchronized with the local maxima or minima of the irregular electrocardiogram signal.

19. (new) The method of Claim 1, wherein:

the trigger points are not substantially synchronized with a particular point on a waveform of the gated electrocardiogram signal.

20. (new) The apparatus of Claim 11, wherein:

the trigger points are not substantially synchronized with a particular point on a waveform of the gated electrocardiogram signal.